

What is claimed is:

1                   1.    A wire feeder for feeding wire from a  
2                   source of wire in a welding system comprising:  
3                   at least one stepper motor disposed adjacent  
4                   the wire and disposed to drive the wire;  
5                   wire feed motor disposed along a wire path  
6                   from the source to a welding torch, wherein the torch  
7                   is closer to the at least one stepper motor than the  
8                   torch is to the wire feed motor, and wherein the wire  
9                   feed motor is disposed to contact the wire and move the  
10                  wire from the source to the torch; and  
11                  the at least one stepper motor is disposed to  
12                  retard movement of the wire toward an arc end of the  
13                  torch.

14                 2.    The wire feeder of claim 1, wherein the at  
15                 least one stepper motor is disposed to slow the movement of  
16                 the wire.

1                   3.    The wire feeder of claim 1, wherein the at  
2                   least one stepper motor is disposed to stop the movement of  
3                   the wire.

1                   4.    A wire feeder for feeding wire from a  
2                   source of wire to a weld, comprising a pair of motors  
3                   disposed on opposite sides of the wire and disposed to  
4                   move the wire to an arc end of a torch, and to retard  
5                   movement of the wire to an arc end of the torch.

1                   5.    The wire feeder of claim 4, wherein the pair  
2                   of motors is disposed to slow the movement of the wire.

1                   6.    The wire feeder of claim 4, wherein the pair  
2 of motors is disposed to stop the movement of the wire.

1                   7.    The wire feeder of claim 6, wherein the pair  
2 of motors are disposed along a wire path from the source to  
3 the torch, adjacent the torch.

1                   8.    The wire feeder of claim 4, wherein the pair  
2 of motors are disposed along the wire path closer to the  
3 torch than to the source.

1                   9.    The wire feeder of claim 4, further  
2 comprising a wire feed motor disposed along the wire path,  
3 closer to the source than to the torch, and disposed to  
4 contact the wire and move the wire from the source to the  
5 torch.

1                   10. The wire feeder of claim 4, wherein the  
2 source includes a reel of wire mounted without a wire feed  
3 motor adjacent thereto.

1                   11. The wire feeder of claim 4, wherein the pair  
2 of motors are disposed directly opposite one another.

1                   12. The wire feeder of claim 7, wherein the pair  
2 of motors are stepper motors.

1                   13. The wire feeder of claim 4, wherein the pair  
2 of motors are disposed one after the other.

1                   14. The wire feeder of claim 4, wherein the pair  
2 of motors are servo motors.

1                   15. The wire feeder of claim 2, wherein the pair  
2 of motors are zero backlash motors.

1                   16. The wire feeder of claim 2, wherein the pair  
2 of motors are gearless motors.

3                   17. The wire feeder of claim 2, wherein the pair  
4 of motors are dc motors.

1                   18. A wire feeder for feeding wire from a  
2 source of wire to a weld, comprising:  
3                   a wire feed motor disposed along a wire path  
4 and disposed to contact the wire and move the wire from  
5 the source to a torch; and  
6                   at least one linear actuator disposed  
7 adjacent the wire and disposed to retard movement of  
8 the wire to an arc end of the torch.

1                   19. The wire feeder of claim 1, wherein the at  
2 least one linear actuator motor is disposed to slow the  
3 movement of the wire.

1                   20. The wire feeder of claim 1, wherein the at  
2 least one linear actuator motor is disposed to stop the  
3 movement of the wire.

1                   21. The wire feeder of claim 13, wherein the at  
2 least one linear actuator is disposed along the wire path  
3 closer to the torch than to the source.

1                   22. The wire feeder of claim 14, wherein the at  
2 least one linear actuator is disposed along the wire path  
3 adjacent the torch.

1                   23. A method of providing wire from a source  
2                   to a weld in a welding system comprising:

3                   driving the wire to a torch with a wire feed  
4                   motor; and

5                   superimposing, onto motion imposed by the  
6                   wire feed motor, motion of the wire between the wire  
7                   feed motor and the weld, with at least one stepper  
8                   motor, wherein the stepper motor retards movement of  
9                   the wire to the torch, and accelerates movement of the  
10                  wire to the torch.

1                   24. The wire feeder of claim 1, wherein the at  
2                   least one stepper motor is disposed to slow the movement of  
3                   the wire.

4                   25. The wire feeder of claim 1, wherein the at  
5                   least one stepper motor is disposed to stop the movement of  
6                   the wire.

1                   26. The method of claim 16, further comprising  
2                   disposing the at least one stepper motor along a wire path  
3                   from the source to the torch, and near the torch.

1                   27. The method of claim 17, further comprising  
2                   disposing the at least one stepper motor along a wire path  
3                   from the source to a welding torch, and adjacent the torch.

1                   28. The method of claim 16, wherein driving the  
2                   wire includes moving the wire to an arc end of the torch,  
3                   and retarding the movement of the wire to the arc end of  
4                   torch.

1                   29. A method of providing wire from a source  
2                   to a weld in a welding system comprising driving the

3 wire with a pair of motors disposed on opposite sides  
4 of the wire and moving the wire to an arc end of a  
5 torch, and retarding movement of the wire to the arc  
6 end of the torch.

1 30. The wire feeder of claim 1, wherein the pair  
2 of motors is disposed to slow the movement of the wire.

1 31. The wire feeder of claim 1, wherein the pair  
2 of motors is disposed to stop the movement of the wire.

1 32. The method of claim 20, further comprising a  
2 driving the wire with a wire feed motor disposed closer to  
3 the source than to the torch.

1 33. A method of providing wire from a source  
2 to a weld in a welding system comprising driving the  
3 wire to a torch with at least one gearless motor for  
4 moving the wire to an arc end of the torch, and  
5 retarding movement of the wire to the arc end of the  
6 torch.

1 34. The method of claim 22, further comprising  
2 driving the wire with a wire feed motor disposed along a  
3 wire path from the source to a welding torch, closer to the  
4 source than to the torch.

1 35. A method of providing wire from a source  
2 to a weld in a welding system comprising driving the  
3 wire to an arc end of a torch with at least one servo  
4 motor for moving the wire to the arc end of the torch  
5 and retarding movement of the wire to the arc end of  
6 the torch.

1           36. The method of claim 24 further comprising  
2 driving the wire with a wire feed motor disposed along a  
3 wire path, closer to the source than to the torch.

1           37. A method of providing wire from a source  
2 to a weld in a welding system comprising driving the  
3 wire to an arc end of a torch with at least one zero  
4 backlash motor for moving the wire to the arc end of  
5 the torch and retarding movement of the wire to the arc  
6 end of the torch.

1           38. The method of claim 26, further comprising  
2 driving the wire with a wire feed motor disposed along a  
3 wire path, closer to the source than to the torch.

1           39. A method of providing wire from a source to a  
2 weld in a welding system comprising:  
3 driving a wire to a torch using a wire feed motor;  
4 retarding the movement of the wire to an arc end  
5 of a torch with at least one linear actuator.

1           40. A method of providing wire from a source  
2 to a weld in a welding system comprising driving the  
3 wire to, and retarding the movement to an arc end of a  
4 torch within one process cycle.

1           41. The method of claim 29, wherein retarding  
2 includes slowing the movement.

1           42. The method of claim 29, wherein retarding  
2 includes stopping the movement.

1           43. A wire feeder for feeding wire from a  
2 source of wire in a welding system comprising:

3 means for feeding wire from the source to a  
4 weld; and

5 means for driving the wire to or retarding  
6 movement to an arc end of a torch within one process  
7 cycle.

1 44. The system of claim 30, wherein the  
2 means for driving includes at least one stepper motor and a  
3 wire feed motor.

1 45. The system of claim 30, wherein the  
2 means for driving includes at least one servo motor.

1 46. The system of claim 32, wherein the  
2 means for driving includes at least one planetary drive.

1 47. The system of claim 33, wherein the  
2 means for driving includes at least one linear actuator.

1 48. A wire feeder for feeding wire from a  
2 source of wire in a welding system comprising:  
3 means for feeding wire from the source to a  
4 weld; and  
5 means for moving the wire to and retarding  
6 movement to an arc end of a torch, disposed on opposite  
7 sides of the wire.

1 49. A wire feeder for feeding wire from a  
2 source of wire in a welding system comprising:  
3 at least one dc motor disposed adjacent the  
4 wire and near the torch; and  
5 wherein the at least one dc motor is disposed  
6 to advance the wire toward an arc end of the torch and

7 to retard movement of the wire toward the arc end of  
8 the torch.

1 50. The wire feeder of claim 36 wherein the dc  
2 motor is a direct drive dc motor.

1 51. The wire feeder of claim 36 wherein the dc  
2 motor is a brushless dc motor.

1 52. A method of providing wire from a source  
2 to a weld in a welding system comprising driving the  
3 wire to a torch with at least one dc motor for moving  
4 the wire to an arc end of the torch, and retarding  
5 movement of the wire to the arc end of the torch.

1 53. A method of providing wire from a source  
2 to a weld in a welding system comprising driving the  
3 wire to a torch with at least one dc brushless motor  
4 for moving the wire to an arc end of the torch, and  
5 retarding movement of the wire to the arc end of the  
6 torch.

1 54. A method of arc welding, comprising:  
2 providing pulse welding power to a welding  
3 arc;  
4 moving wire to the arc, wherein the wire is  
5 consumed in the arc;  
6 monitoring the arc, to determine when a short  
7 occurs; and  
8 retarding the motion of the wire in the event  
9 a short is detected.



1                   55. The method of claim 54, wherein retarding is  
2 slowing.

1                   56. The method of claim 54, wherein retarding is  
2 stopping.

1                   57. The method of claim 54, wherein retarding is  
2 reversing.

1                   58. A method of arc welding, comprising:  
2                   providing pulse welding power to a welding  
3 arc, including a peak current phase and a background  
4 current phase;  
5                   moving wire to the arc, wherein the wire is  
6 consumed in the arc;  
7                   retarding the motion of the wire in at least  
8 a part of one of at least one of the peak and  
9 background phases.

1                   59. The method of claim 58, wherein retarding is  
2 slowing.

1                   60. The method of claim 58, wherein retarding is  
2 stopping.

1                   61. The method of claim 58, wherein retarding is  
2 reversing.